The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Patent Law Reform

LAST April the Board of Trade appointed a Committee under the chairmanship of Mr. Kenneth Swan, K.C., to consider changes in the Patents and Designs Acts with the following terms of reference:—

"To consider and report whether any, and if so what changes are desirable in the Patents and Designs Act, and in the practice of the Patent Office and the Courts in relation to matters arising therefrom. In particular, the committee is requested to give early consideration to, and to submit an Interim Report or Reports on (a) the initiation, conduct and determination of legal proceedings arising under or out of the Patents and Designs Acts including the constitution of the appropriate tribunals, and (b) the provisions of these Acts for the prevention of the abuse of monopoly rights; and to suggest any amendments of the statutory provisions or procedure thereunder which in their opinion would facilitate the expeditious settlement and the reduction of the cost of legal proceedings in patent cases and would encourage the use of inventions and the progress of industry and trade."

There has been widespread dissatisfaction with the application of the Patents Law, not because the law in itself is bad, but because of the machinery for its application. It is well to remind ourselves that the object of patents is to promote trade. At one time the Sovereign granted monopolies which were fundamentally intended for the same purpose, but this practice naturally led to certain abuses when Court favourites were able to obtain monopolies which they used in restraint of trade. The Statute of Monopolies enacted, as a consequence, in the reign of James I, has since been fundamentally adopted in every country in the world and has served as a foundation of industrial enterprise and development. By virtue of this and subsequent acts, patents are granted to inventors or to persons who introduce an invention into this country. The purpose of the patent is to provide temporary freedom from competition by others who might try to manufacture the same article or to use the same process, until the new business has had a chance to become established. A secondary aim of patents is that the inventor shall receive due reward for his invention; this is obviously dependent on the first, and is designed to encourage invention and thus to encourage trade.

The Association of British Chemical Manufacturers has set up a Joint Chemical Committee to prepare evidence for submission to the Board of Trade Committee.

On Other Pages

The Joint Committee has now issued Part I of its report in the form of a memorandum which is to be submitted to the Board of Trade Committee. Copies are obtainable from the A.B.C.M., 166 Piccadilly, price 1s. The Chemical Committee comprises representatives nominated by the A.B.C.M., the Biochemical Society, the British Association of Chemists, the Chemical Society, the Institution of Chemical Engineers, the Royal Institute of Chemistry, the Society of Chemical Industry, and the Wholesale Drug Trade Association.

Three major proposals are made in the memorandum, designed to reduce the granting of invalid patents, to reduce and to expedite patent litigation, and to maintain the flow of research and invention. There is little doubt that large numbers, possibly more than half the total, of the patents now issued are invalid and that these patents are taken out for the purpose of blocking possible legal actions to upset a main patent. An authority has stated that every patent granted, whether valid or not, is worth £3000, because it costs that sum on the average, even to the successful litigant, to upset a patent. If, therefore, the number of invalid patents can be materially reduced, a very substantial reduction in the cost of litigation will follow and, alternatively, other processes will be liberated for use which are now blocked, not because of valid patents, but because of the expense of getting invalid patents upset. The first proposal to this end is to increase the powers of the Comptroller to reject patent applications. This is a very difficult question, because the Comptroller's powers must clearly be limited by law. According to the memorandum, the Comptroller, in addition to his present powers, should be able to refuse patent applications on the grounds (a) that the invention is not a manner of manufacture or otherwise of industrial significance and (b) that the invention does not contribute to the art any item of new knowledge. Clearly, there must be some definition of the terms used and unless the terms can be defined it is likely to prove difficult to give to the Comptroller the additional powers suggested. It is understood that an attempt to define the terms satisfactorily will be made in a second memorandum.

The second major proposal is that special Patents Tribunals shall be set up to hear patent actions and that there shall be no appeal from such Tribunals except by leave, and then only to the High Court upon a point of law. The essence of this proposal is that the Tribunal should be a technical body so that it would not be necessary in future for litigants to spend days in instructing the Court on simple matters of scientific knowledge, as is now the case. This proposal is so important that we repeat here the words of the memorandum:—

"We suggest that patent actions and all patent matters now dealt with in England by the High Court and the Patents Appeal Tribunal should be heard by a special Patents division of the High Court, consisting of three judges appointed from amongst barristers who have had patents experience, together with one, or two, lay members selected from a permanent panel of, say, six or eight technically and scientifically qualified persons. The technical panel should together cover the whole of the science and technology met with in patent specifications in the sense of being competent severally in their own spheres to understand such documents with the minimum of instruction by counsel and witnesses. The panel members should not undertake any other employment, and it is important that their status and emoluments should be of a nature to attract the right persons. The full Court should hear infringement and revocation proceedings, but other patent matters should be heard by a court of one judge and one lay member except that any such matter should be referable to the full Court at the direction or by leave of the Court. The Court should render a judgment, which should be the decision of the judge or judges in consultation with the lay members of the Court in technical matters. There should be no appeal except by leave, and then only to the House of Lords directly. With a view to reducing the costs of patent litigation, solicitors and patent agents should have right of audience, but not on appeal to the House of Lords."

The third decision of the Committee is that universal compulsory licenses, as recommended in a minority report by Dr. G. H. Frazer (representing the Therapeutic Research Corporation and its constituent firms), should not become the law. It is unnecessary to go into detail on this subject as it was fully dealt with in THE CHEMICAL AGE of September 9, in a leading article entitled "Patents and Research." It will be sufficient here to state that the committee has accepted the views put forward in our leading article in their entirety. We

consider that this decision is wise and in accordance with the best interests of industrial chemical development.

The Board of Trade Patents Committee issued a questionnaire on which this present memorandum has been based. It is of interest to note that the first of these questions asked whether those giving evidence agreed that complaints are justified to the effect that British patents are used to the detriment of the public interest, for forming cartels for supressing and retarding competitive development in industry and for similar purposes, and if so to give examples of the way in which patents are or have been misused. The Joint Chemical Committee considered this point in very considerable detail and came to the conclusion that the abuses of patent monopoly by the suppression of inventions so often charged against patentees in the popular press are usually found on examination either to be non-existent or to be abuses not of patents, but of the power of wealth. The Committee has endeavoured to counter any abuse by reducing the grant of invalid patents, by reducing the costs of fighting patent actions and by strengthening the powers of the Court to grant compulsory licences. The rather important proposal has also been made that it should be made compulsory on the patentee under some substantial penalty to register all patent licences on the Register of the Patent Office and to file with the Comptroller a copy of the licence and any documents referred to therein, together with a Statutory Declaration that the documents filed disclose all terms and conditions of the licence and all considerations therefor. This information would be available primarily to whatever Government department would be charged with seeing that British trade was not restricted by the agreements.

The results of the deliberations of this Committee appear to us to be praiseworthy in the extreme. In our view it is an excellent report and to the credit of chemists generally. We trust that the Board of Trade Committee will come to the conclusion that the reforms here suggested are desirable.

NOTES AND COMMENTS

Germany's Metal Losses

A BIRD'S-EYE view of the losses in supplies of metal which Germany has suffered as a result of recent military operations was given in the House of Commons on Tuesday last week by Mr. Foot, as spokesman of the Ministry of Economic Warfare, in reply to a question by Mr. Graham White. The picture is highly encouraging. As compared with 1943, the iron-in-ore supplies of the Reich have been reduced by 65 per cent. This is accounted for by actual military operations in Lorraine and Luxembourg, by the withdrawal of Swedish ships from trade with German ports, and by the inaccessibility of Spanish supplies. Pig-iron capacity is down to about 45 per cent. of the amount available last year, and steel furnace capacity to about 40 per cent. With Bor (Yugoslavia) and Outukumpu (Finland) out of his control, and Spanish and Turkish supplies cut off, the enemy's copper resources are reduced by some 60 per cent.; lead supplies are down by 40 per cent. owing to the loss of Balkan mines, and the stoppage of scrap metal collections in France and the Netherlands. The entire supply of chrome to Germany would appear to have been cut off, as a result of the interruption of all rail traffic from the Balkans to Germany, while the loss of molybdenum ores from Finland, Greece and Yugoslavia represents a two-thirds cut in total supplies of that metal. The loss of the French aluminium industry and the capture of Dalmatian islands means that about half Germany's bauxite resources have vanished, while the cessation of supplies of cobalt from Finland accounts for nearly 80 per cent. of the total quantity of that metal, with which the enemy sustained the Fischer-Tropsch catalysis of synthetic oil. The only sources of tungsten open to the enemy since the agreement made with the Spanish Government were very small deposits in France and occasional blockade-runners from the Far East: and now even these are denied him. There may be some reserves of these metals still available within the shrunken confines of the

"Greater Reich," but there seems little prospect of replenishing them.

Soviet Science

AMONG the interesting articles in the latest issue of *The Advancement of Science* (3, 9), published by the British Association (price 5s.) is a survey of science in the U.S.S.R., by Alexander Fersman, a geochemist of international reputation. The survey, which was received (in Russian) through the Soviet Embassy in London, treats the subject in a broadly historical manner, ranging from pre-revolutionary science through the achievements of the present day and outlining hopes for the future. An appendix gives some really remarkable figures of the progress of scientific research in the Soviet Union. A few general facts, and some items of chemical interest, will give an idea of the scale of scientific advancement in Russia. In 1915 the total of scientific research centres was between 120 and 150; independent scientific institutes now number 2256. The Academy of Sciences, 25 years ago, had two investigators working on chemistry; now there are 367. Development of natural resources has been one of the greatest achievements of Russian science. In 1914 the country's known resources covered only 14 chemical elements, of which only four were known to exist in anything like sufficient quantity; in 1916 Vernadsky noted reserves of raw materials for 30 elements. By 1932 the number of elements actually used had reached 60, and in 1934 the discovery of large boron deposits in Western Kazakhstan filled one of the most important gaps. Yet to-day no less than 60 per cent. of the territory of the Soviet Union still needs prospecting geologically!

Theory Applied to Industry

A REMARKABLE feature of the work undertaken is the correlation of different branches of science, notably the intermingling of chemistry and physics. This last has resulted not only in the development of classical physical chemistry, but in the creation of a new branch, chemical physics, which aims at using new physical methods of analysing the most complex chemical processes of nature. Kurnakov and his school utilise purely mathematical methods to create a special chemical topology. The famous Solikamsk potassium deposits, which have given Russia the first place in the world in reserves of potash salts, were discovered by means of a theoretical prognosis—an analysis of the probability of discovering deposits of potassium salts in the peculiar conditions of the western Urals. Complicated investigations into the equilibria existing in a system of salts with numerous components had to be carried out before a correct balance could be assured for the new industry which has since developed there. Future scientific progress is being made secure by the training of new staffs. This has given specially good results in the realm of physics and mathematics—always a strong point of the Russians—but also during the past 20 years two healthy schools of chemists have developed; the Karpov Institute, led by Bach and Frumkin, and the Institute of Inorganic Chemistry, under Kurnakov. With her vast, and still largely untapped, reserves of man-power and natural resources, the Soviet Union is bound to play a brilliant part in the future development of chemistry.

Airborne Fibre

THERE is little need to stress the importance in airborne operations of a fibre capable of carrying heavy weights while requiring the minimum of bulk and load for its own transport. Such a fibre has been developed by British Celanese, Ltd., under the name "Fortisan", and has played a large part in recent operations in Holland, having been used for the construction of specially designed parachutes. This fibre, which the makers claim to be the strongest—natural or synthetic—in the world, has been employed for Service purposes since the early days of the war, and has never yet "entered civilian life." Besides being used in the construction of the parachutes themselves, it has been utilised for the load-suspending cords, and in barrage balloons. The gossamer-like fineness to which its filaments can be brought down, coupled with its great strength and high heat resistance, indicates that this material can make a valuable contribution to the extension of new and improved designs in electrical apparatus. The basis of its manufacture is the same as that of the familiar "Celanese."

Chemical Industry for Cumberland

A Regional Development Plan

IT is universally agreed that one of the prime factors to be considered for the post-war period is full employment for all, and it seems reasonable to suppose that the best possible development of all our national resources from the national point of view might be regarded as a means to this end. The state of the "Special Areas" during the depression of the 1930's is an indication of what can happen if proper development is neglected. Wise men throughout the country are therefore giving their mind to the formulation of plans whereby a recurrence of this state of affairs can be avoided.

Among the most constructive thinkers along these lines is Mr. W. C. Devereux, chairman and managing director of High Duty Alloys, Ltd., whose broad plan for the future industrial development of South Wales has already been described in our columns (August 21, 1943, p. 179). For a variety of reasons, nothing has been done about that plan, and Mr. Devereux, has now produced a plan, on rather more detailed lines, for the West Cumberland area, at the invitation of the West Cumberland Development Council, an extremely active body. The plan considers the natural resources of the area and the already established industries, and endeavours to establish (a) how far existing industries are likely to expand or contract, and (b) what industries should be encouraged to enter the area of because natural suitability; also (c) the probable consequences measured by the number of people employed and the volume of trade. "Natural suitability" is taken in its widest sense: the aim is to achieve a balanced industrial development so that the area is not over-dependent on any one industry.

Mr. Devereux is an engineer by training, and belongs by subsequent experience to the profession of trained industrial management. Research that is being carried out in the laboratories of High Duty Alloys, under his encouragement, is largely of a fundamental nature, and gives a guarantee that he is not likely to consider merely the surface of a problem. In his view the problem of industrial planning for the nation differs little, except in scale, from the problems which any professional manager of a large industrial works has to solve as part of his normal job.

A "Special" Area

The West Cumberland area which is dealt with in the present plan was scheduled as a "Special Area" by the Act of 1934. Within the area, in July, 1932, 15,577 persons were registered as unemployed out of an insured population of 35,340. Allowing for persons employed in local government, public utilities, etc., the target for post-war employment is about 27,500 persons. West Cumberland's difficulty in the past has been its dependence on one or two industries, in this case mining and iron and steel; consequently, attention is given in the plan not only to existing industries but to the introduction of industries, both such as could exploit indigenous resources and entirely new ones, not closely linked with existing industries or resources.

Coal and iron ore mining, even after the war, must continue to be the principal industries of West Cumberland, but even if high production is maintained, the number employed in them is not likely to exceed 7900. Examination of the area has not revealed any new mineral resources, and has emphasised the need for the establishment of industries other than mining. The manufacture of coke appears capable of development; if modern plants were installed to bring the capacity of local coke ovens up to about 470,000 tons per annum the net value of the coke produced could be raised to about £80,000 per annum from the present existing capacity of 410,000 tons (£70,000) per annum.

Cumberland coals have a high volatile content which gives them good coking properties, but they tend to have higher contents of chemical impurities, notably phosphorus and sulphur, than the best coking coals from the Durham field. Since the production of the Cumberland blast furnaces consists almost entirely of hematite pig iron low in phosphorus and sulphur, it is not possible for the local blast furnaces to consume West Cumberland coke alone. The coke most suitable for bringing into the area would be derived from Durham.

Blast Furnace Capacity

The output of pig iron and ferro-alloys from its blast furnaces determines the prosperity of the iron ore industry in West Cumberland. There is in the area efficient blast furnace capacity for the production of approximately 48,000 tons per month of hematite pig iron and ferro-alloys. This capacity is divided between the blast furnaces of the United Steel Companies (Workington Iron and Steel Co.) and the blast furnaces of the Millom and Askam Hematite Iron Co. These furnaces are principally engaged in the manufacture of hematite pig iron which is a long-standing speciality of the North-West coast. In recent years there has been some production of blast furnace ferro-silicon in the area, but this is relatively small in comparison with the hematite pig iron output. Although the hematite pig iron output was originally derived almost entirely from local ores, there has been an import of some high grade hematite ore into the area for many years.

There is no reason to advocate any expansion in hematite pig iron production. Gradual exhaustion of the local reserves of hematite iron ore has naturally tended to limit the output from West Cumberland furnaces, but the

principal limiting factor has probably been the character and quality of the material produced. Hematite pig iron is a product which is more expensive than the basic pig iron produced elsewhere in the U.K. and its uses are limited to the manufacture of high quality acid open hearth steels, and high quality castings (including malleable castings). The market for hematite pig iron is therefore limited in scope and is determined mainly by the demand for certain types of steel.

Considerable attention has recently been directed to the possibility of discovering new hematite iron ore bodies in West Cumberland and to making the fullest use of those which are already known. Results have shown that there appears to be little likelihood of developing any substantial new ore bodies, and there seems to be little doubt that the future of iron ore mining in West Cumberland will depend on the reserves of existing mines.

A large part of the output of hematite pig iron from West Cumberland blast furnaces is made into acid bessemer steel, which offers certain advantages over other steels in the manufacture of railway material, particularly rails, but the average value per ton of most railway material is not great compared with more highly worked steel products. Acid bessemer steel offers, however, certain advantages over other steels in working, since it possesses marked free-machining qualities, is easily welded (making it suitable for the manufacture of welded steel tubes) and has good case-hardening properties which make it suitable for certain drop forgings. It is considered that there would be justification for the establishment in West Cumberland of an additional steel finishing capacity which would make full use of the particular properties of acid bessemer steel. The free-machining properties are probably most useful in this connection and it is suggested that a plant for the manufacture of screws, bolts, nuts, washers, etc., could, with advantage, be sited within the area.

Bessemer Steel Output

It is suggested that the acid bessemer steel industry should maintain an output of about 250,000 tons of steel per annum from existing capacity and that this output should be allocated roughly as follows: 70,000 to 80,000 tons per annum of finished rolled products, particularly railway material; 20,000 to 25,000 tons per annum of bar and rod should be used in the manufacture of screws, nuts, bolts, etc.; 70,000 to 100,000 tons of semi-finished products should be sold on the national market.

Of the remaining 350,000 tons of pig iron and ferro-alloys which it is suggested should be produced annually, a proportion is high quality hematite pig iron, remarkably low in harmful impurities. Among the suitable markets for this pig iron is that for the manufacture of crucible steel, generally regarded as one of the highest quality engineering materials available, and used largely in the manufacture of high quality engineering hand edge tools and for other special purposes. A proportion of the West Cumberland high quality pig iron is normally sent to Sheffield for this purpose, but apart from certain commercial considerations, there are few reasons why crucible steel should not be made in relatively small quantities in West Cumberland and either sold as steel or preferably manufactured into tools.

It is suggested, in short, that the iron and steel industry in West Cumberland should aim at maintaining a production of about 600,000 tons of pig iron and ferro-alloys annually, which should be allocated approximately as follows: 300,000 to 350,000 tons should be despatched from the area as high-grade hematite pig iron, ferro-alloys and refined irons; 200,000 to 250,000 tons should be made into steel in acid bessemer converters; and 5000 to 10,000 tons should be made into crucible steel.

Non-Ferrous Ores and Metals

The Lake District has a rich history of mining for the non-ferrous metals and many years ago the district round Keswick was one of the most important copper-producing areas of the U.K. Most of the ore occurrences in the area are found in quartz veins traversing either ancient shales and mudstones or ancient volcanic rocks. The veins are usually not of great width and many of them were originally developed by adit mining. The richer veins have usually been followed in depth by means of shafts which may be 300 ft. to 400 ft. deep. The principal metalliferous minerals found are chalcopyrite (copper), blende (zinc) and galena (lead), some of which is argentiferous. Oxidised and enriched minerals derived from the sulphide minerals were obtained in the past from workings in the upper parts of the mineralised veins, but there are no oxidised minerals now available in commercial quantities. In some mines galena and blende are associated with barytes. There are also minor occurrences of molybdenite, gold, antimony, manganese, and cobalt.

Because of their small extent, the non-ferrous mines in West Cumberland cannot employ to the full the opportunities afforded with modern mining equipment. Unfortunately, these factors will carry even more weight in the post-war period, and it is fairly certain that it will not be possible to persuade private industry to consider re-opening the old mines. There are, however, various new methods, some of which are still experimental, for extracting metals from ores, which might be worth while trying, particularly if they can be shown to be capable of economic operation on a smaller scale than existing methods of extraction. This would be a further argument in favour of an exhaustive survey of mineral resources in addition to the work already undertaken. There cannot, however, be said to be good prospects for successfully stimulating non-ferrous metalliferous mining in

West Cumberland in order to provide a commercially prosperous industry.

Mining and quarrying of minerals other than coal and iron ore accounted for the employment of between 800 and 900 persons in West Cumberland before the war. Between 700 and 750 of these appear to have been engaged in the quarrying of limestone and igneous rocks (including granite). Limestones in the area are of good quality with only small impurities of silica (between 0.90 and 1.00 per cent.), alumina and ferric oxide (between 0.60 and 1.60 per cent.) and very low in phosphorus and sulphur. In some places, notably around Millom, there is a small percentage of magnesium carbonate.

Limestone

By far the largest single use for limestone in the area in the past has been for blast furnaces. If the annual output of pig iron is to be maintained at about 600,000 tons, the blast furnace requirements of limestone will amount to about 220,000 tons per annum. Both the Workington Iron and Steel Company and the Millom and Askam Hematite Iron Company have their own limestone quarries, which in 1936 accounted for 39 per cent. of the total output in the area.

A substantial proportion of the output of limestone other than for use in local blast furnaces was used for agricultural purposes either as ground limestone or as burnt lime, and it is estimated that the post-war demand for agricultural lime in the area might be 170,000 tons annually in terms of limestone. Furthermore, some of the West Cumberland quarries are conveniently situated for rail transport and these quarries may be able to expand their output of burnt and hydrated lime and in some cases their output of limestone for despatch from the area. It should be possible, for example, for West Cumberland quarries to supply substantial quantities of limestone for the Scottish steel industry, and of burnt lime for other industries, particularly on Clydeside and in the Glasgow area, at prices competitive with lime supplied from other areas. To do so it would be necessary to instal modern lime-burning equipment at quarries with good access to the railway or to the ports of Maryport, Workington, Whitehaven or Millom.

Barytes

Before the war the production of barytes in West Cumberland was very small, and in 1937 production was nil. There are, however, several workable occurrences of barytes in West Cumberland, most of which are being exploited in war-time, and in mid-1944 the annual rate of output of barytes from West Cumberland mines was probably about 25,000 tons. At present only ore from the upper levels is being worked and this can be treated in a simple gravity concentration plant to produce high-grade barytes with an average barium sulphate content of 96 per cent. It is doubtful whether the installation of modern dressing plant for recovering zincblende and galena concentrates as well as barytes would be warranted in view of the relatively high capital cost of such a plant, the low value of the products obtained and the uncertainty of the ore reserves. There is little information available regarding reserves of barytes which warrant exploitation in the area, but it is doubtful whether the mines at present working have more than five years reserves at the present rate of extraction.

Gypsum and Anhydrite

Though there is no production of gypsum or anhydrite in West Cumberland at present, extensive deposits are known to occur in the St. Bees area, and the gypsum and anhydrite deposits in the Barrowmouth mine were worked intermittently between 1803 and 1908, during which period an area of about 2 acres was extracted. In 1908 the mine was closed, partly owing to the increased quantities of mixed gypsum and anhydrite being obtained and partly owing to the unsuitability of the method of mining then employed. It is estimated that existing gypsum and anhydrite reserves, extending for an area of some 14,000 acres and varying in depth from outcrop to 1400 ft., amount to at least 3 million tons above adit level at Barrowmouth.

As the depth of the mine increases there is an increase of the anhydrite content at the expense of gypsum and the gypsum and anhydrite occur in intimate mixtures. Either gypsum or anhydrite can be used for plaster making, but nobody has yet used a mixture of the two and it is doubtful whether this would be successful. Moreover it would be very difficult economically to separate the two. It is suggested that samples from the Barrowmouth mine should be examined by the Building Research Station with a view to determining their possible uses in the manufacture of plaster.

Little is known about the economics of the use of gypsum and anhydrite in the manufacture of sulphuric acid and cement. This comparatively recent process is employed (among other places) at Wolfen in Germany, at Miramas in France, and by I.C.I. at Billingham. Though the reactions involved are simple, success depends to a considerable extent on close control of the process at certain stages. There does not, however, appear to be any reason why a mixture of gypsum and anhydrite, such as is obtained at Barrowmouth, should not be successfully employed, though trials would first be necessary. The limiting factor, ho vever, appears likely to be the minimum economic capacity for such a plant and it is doubtful whether a capacity of less than 6500 tons of 100 per cent. sulphuric acid per month would be economic. The requirements of West Cumberlnad for sulphuric acid are probably not sufficient to justify the establishment of this amount of new sulphuric acid capacity at the present time and there would be little prospect of despatching the acid from the area. The output of cement from such a plant using 50/50 gypsum/anhydrite as raw

material would be of the order of 6000 tons per month, and this might be marketed locally.

It is possible, also, that a useful cement might be made by mixing partly calcined gypsum and anhydrite mixtures with blast furnace slags, but experimental work would need to be carried out if the manufacture of cement from these materials were contemplated.

Rayon Production

The principal raw materials for rayon production are sulphite pulp, caustic soda, carbon disulphide and sulphuric acid. These materials are not all at present available in West Cumberland, but there are in fact few rayon plants in the U.K. which are sited very close to supplies of all these raw materials, and rayon plant located close to one of the West Cumberland ports should be able to import sulphite pulp from Canada as cheaply as any producer located elsewhere.

The consumption of caustic soda in rayon manufacture (allowing for partial recovery of some of the caustic soda used in the process) amounts to roughly 1 lb. per lb. of rayon produced. A plant with a capacity of 10 mill. lb. of rayon per annum would require, therefore, approximately 4460 tons of caustic soda per annum. This caustic soda could be obtained from existing electrolytic alkali plants in Lancashire, and the rail haul involved would not be more than about 150 miles. The erection of an electrolytic alkali plant in West Cumberland with the object of supplying a local rayon industry would not be justified unless a ready market was available for the chlorine produced as well. The main possibility in this connection is that chlorine might be used in making magnesium chloride from magnesia. There has, however, been a considerable expansion in capacity for making magnesium chloride during the war and one plant which has been established with its own electrolytic chlorine unit is in fact discharging caustic soda to waste.

The consumption of carbon disulphide is between 0.4 and 0.45 lb. per lb. of rayon produced, and this is equivalent to about 1900 tons per annum for an annual output of 10 mill. lb. of rayon. The West Cumberland By-Products Co. at Flimby at present produces carbon disulphide from imported sulphur for supplying to British Rayophane, Ltd., at Wigton. It is possible that the proposed rayon plant would be able to obtain a proportion of its supplies from this company, which might be willing to increase its capacity.

Between 1.5 and 1.6 lb. of 77° sulphuric acid is required for the production of 1 lb. of rayon, equivalent to an annual requirement of 7360 tons of sulphuric acid for a plant of the capacity proposed. Sulphuric acid is not easily transported for considerable distances, and the supply of this amount from outside the West Cumberland area might involve substantial transport charges. Sulphuric acid could, however, be obtained locally also from the West Cumberland By-Products Co., assuming that it could expand its output.

Among the minor industries eleswhere associated with the coal and coke, and iron and steel industries, are coal-tar by-products and chemicals, heavy constructional engineering and mining equipment. In West Cumberland a small by-product and chemical industry has already been developed and there is a fairly full utilisation of coke-oven by-products. This industry is, however, on a small scale and will remain so since the local coke industry is not very extensive.

Considering the small size of the prosposed local textile industries and tanning industry, and the wide range of chemicals they require, it is unlikely that these industries will be able to obtain many of their chemicals locally. In the textile industry the major requirements are likely to be for bleaching chemicals, such as sulphuryl chloride, other chlorine derivatives and sulphur dioxide; chemicals for non-shrinking treatment for wool such as sodium bisulphite or sodium sulphide associated with various enzymes, and dyestuffs both for woollen and rayon fabrics. The tanning industry requires chemicals for bating (principally an infusion of pancreas with ammonium salts) and for tanning. For the latter purpose either vegetable tanning extracts such as quebracho are used, or chemicals such as bichromate and sulphur dioxide or basic chromium sulphate, or phenolsulphonic acids mixed with formaldehyde (the synthetic tan), or possibly aluminium sulphate and aldehyde. Of the foregoing, sulphur dioxide might be obtained locally. The tanning industry, will, of course, require substantial quantities of lime from local sources.

The rayon industry will require sulphuric acid, carbon bisulphide and caustic soda, of which chemicals the first two could be obtained locally. There is not, however, likely to be sufficient demand for chlorine locally to warrant the establishment of a caustic soda plant. The local coke ovens and gas works provide some raw materials for local chemical industries, principally spent oxide, tar and tar oils.

Sulphur Chemicals

It will be seen from the above that the local chemical industry is likely to be mainly concerned with the production of sulphur chemicals. These chemicals, of which sulphuric acid is the chief, can be derived from various raw materials, the principal being pyrites, sulphur, gas works' spent oxide, gypsum and anhydrite. Of the two existing sulphuric acid plants in the area, one uses imported pyrites, and the other gas works' spent oxide. The latter plant imports sulphur for the manufacture of carbon bisulphide. The probable requirements of West Cumberland for sulphuric acid after the war are estimated at approximately 25,000 tons of 100 per cent. acid. It is suggested that there should be room for expansion of both existing plants.

Sulphuric acid requirements for the viscose rayon industry are likely to amount to 10,000 tons

of 100 per cent. acid per annum, and there will be small industrial requirements from other users. The West Cumberland By-Products Co. already supplies the existing transparent viscose paper industry and would, therefore, be an obvious choice as suppliers of sulphuric acid for the proposed new rayon staple fibre plant. This company might also supply sulphur dioxide, sulphuryl chloride and sodium bisulphide, if the demand for these chemicals proved sufficiently large. Carbon bisulphide is at present manufactured by the West Cumberland By-Products Co., Ltd., largely to meet the requirements of the transparent viscose paper plant of British Rayophane, Ltd. Existing capacity is nearly 700 tons per annum. This is only sufficient to meet present demands, and a new rayon staple fibre plant would probably require an additional 1500 tons of carbon bisulphide per annum. The total capacity would need, therefore, to be increased to about 2600 tons per annum. This could be done without difficulty.

The proposed increase in output of sulphur chemicals in the area would lead to increased imports of pyrites and sulphur. From about 5000 tons, imports of pyrites would be increased to about 15,000 annually, and sulphur imports would be increased from about 550 tons to at least 2200 tons per annum. The net output of a chemical industry producing about 25,000 tons of 100 per cent. sulphuric acid and 2600 tons of carbon bisulphide should amount to about £75,000 at 1937 prices. The numbers employed should be about 160. If the suggested quantities of superphosphate fertilisers are made, an additional £15,000 net value of output might be obtained and additional labour of about 60 would be employed.

Coke-Oven By-Products

Benzol, sulphate of ammonia, tar oils, creosote, and cresylic acid are recovered from the Workington Iron and Steel Company's coke ovens, either at the ovens themselves or at a by-product plant. This plant recovers the full range of tar oils, creosote, pyridine, etc., and in the past also treated crude tar from the coke ovens of the Allerdale Coal Co.

The distillation of crude tar from the Cumberland Coal Co. (Whitehaven) is carried out by Messrs. T. Ness at their plant adjoining the coke ovens. The distillation of gas works' tar as well as the treatment of spent oxide, is carried out by the West Cumberland By-Products Company. The industrial possibilities of coke-oven and gas-works' by-products appear to be virtually fully exploited already in West Cumberland and no recommendations are made for further development of industries based on those materials.

An important war-time development in West Cumberland is the introduction of the manufacture of electric furnace steel. This is not primarily dependent on resources indigenous to the area, as the main items in the cost of production are steel scrap and electricity, and no decision is believed to have been reached yet regarding continued operation of the plant after the war. Yet, if ample supplies of cheap steel scrap are available for import and if the demand for steel is maintained at a high level after the war, the continued operation of the plant may be justified.

Cosmetics and Drugs

Shortly before the outbreak of the war, the manufacture of cosmetics, etc., was introduced into West Cumberland by Messrs. Eugene, Ltd This company now has two factories, employing some 200 and 60 persons respectively. Their experience in West Cumberland is believed to have been successful and there are reasonable prospects that they will expand after the war.

There has not hitherto been any plant for the manufacture of drugs established in West Cumberland, though many of the advantages experienced by the cosmetic industry such as in marketing, in being in an area free from smoke, and in having soft water readily available, would also apply to the manufacture of drugs. It is understood that there have already been some discussions with the West Cumberland Development Council in regard to the siting in West Cumberland of a large plant for the manufacture of penicillin. This development would be most suitable for the area, and even if this project itself does not come to anything, it is suggested that other attempts be made to introduce the manufacture of drugs and pharmaceuticals into the area.

Magnesia

Though a plant for the manufacture of magnesia from sea water must be located on the coast, it makes little difference whereabouts on the coastline the site is chosen, provided that lime is available. Strategic considerations were presumably the principal reason for choosing West Cumberland as the location for a magnesia plant. This plant is a government-owned one, managed by the British Periclase Co., Ltd. There has been a great expansion in the production of domestic magnesia for use in the manufacture of magnesium metal and there are now several magnesia plants in the country. After the war, however, plants making magnesia from sea water are likely to find it difficult to obtain markets at economic prices. The most hopeful markets for development of sea-water magnesia after the war would appear to be in the preparation of pharmaceuticals and in the manufacture of magnesium oxychloride cements and flooring materials, and it is for such purposes as these that the output of the Cumberland plant may have to be sold. Sea-water magnesia can be of high purity suitable for high-grade refractories. Hitherto magnesium oxychloride floorings have not been popular with architects and builders, although they are admitted to have considerable advantages and their use in the U.S.A. is progressing. Though the future of the Cumberland plant is uncertain, it is assumed that operations will be continued after the war.

Sulphur and Pyrites

Report on Production and Consumption for 1943

FOR widely varying reasons, world production of native sulphur decreased sharply in 1943, according to the Bureau of Mines, U.S. Department of the Interior. For a great part of the year Sicily was involved in a battle zone—a condition that reduced sulphur production to negligible proportions. In the United States past years of record-breaking output had accumulated such stock-piles that in spite of an increase in consumption operators were able to slow down production to a rate that would gradually reduce these stocks.

As the submarine menace was brought under control more bottoms were assigned to the transport of sulphur. Consequently, exports from the U.S.A. increased, relieving shortages in various Allied and neutral countries. This development tended to ease the search for domestic sources in many, but not all, importing countries. Notable exceptions were Argentina, which is turning to its native sulphur deposits, and Great Britain, which continued its investigation of coal by-products.

The status of pyrites production in 1943 is clouded by lack of authentic information from Axis-dominated areas. Output in Spain, Portugal, and Cyprus has been curtailed in varying degree by shipping restrictions. Rumours indicate that Germany is suffering an acid shortage, but it is not clear that the cause is deficiency in raw materials. Although many countries that formerly purchased pyrites from Spain and other exporters succeeded in finding alternative sources, total world production in 1943 probably was somewhat below a record level. From the few official and unofficial statistics available only an estimate of total world production can be given for 1943: sulphur output probably did not exceed 3,200,000 long tons and pyrites 9,000,000 long tons (containing about 3,900,000 tons of sulphur).

American Sulphur Prices

In the United States prices of sulphur and acids were comparatively stable, and with minor exceptions the Office of Price Administration continued the General Maximum Price Regulation. Such an ample supply of sulphur was available that the War Production Board found allocation unnecessary. However, more difficulty was encountered in supplying the demand for sulphuric acid, and it was placed under allocation in the latter part of the year.

In the United States production of crude native sulphur in 1943 totalled 2,538,786 long tons, 27 per cent. less than the record tonnage attained in 1942. In addition to this tonnage of relatively pure crude sulphur, a comparatively small amount of native sulphur ore, containing 10 to 50 per cent. sulphur, was mined and sold for agricultural purposes.

For the fourth successive year, U.S. pyrites production, attained a record level, exceeding the 1942 total by 11 per cent. Nearly all (96 per cent.) of the domestic pyrites output was classified as fines, and the remainder as lump. The gross weight produced in 1943 was 802,384 long tons (40.9 per cent. sulphur content) as against 720,363 tons (42.6 per cent. sulphur) in 1942.

Consumption of sulphur in the United States attained the new record of 2,525,237 long tons in 1943, compared with 2,472,396 tons in 1942. Over three-quarters of the sulphur, from all sources, consumed in the United States is converted into sulphuric acid before entering its final use. In 1943, production of sulphuric acid is estimated to have been 11 per cent. greater than in 1942, the chemical industry accounting for 1,520,000 long tons.

The upward trend in U.S. sulphur continued during the first half of 1944. Apparent sales, at 1,720,619 tons, were 13 per cent. higher than in 1943 and deliveries from mines 28 per cent. higher, with 1,756,175 tons.

Returnable Empties

Priority of Transport

THE Ministry of War Transport Road Haulage Organisation has made arrangements for the immediate return of empty packages of all descriptions *which are urgently required*. Unless the vehicle which delivered the goods is needed for more essential traffic, it will be used for returning such empties, provided that the person offering the full packages to the Unit Controller (for distances in excess of 60 miles) or the Area Road Haulage Officer (for short distances) satisfies him that the empties must be given priority. Where it is not possible to use the same vehicle, Road Haulage Officers will do their best to find alternative vehicles. The Road Haulage Organisation can also be asked to provide facilities for the return of empties which when full may have been forwarded by rail.

The railways will make every endeavour to provide facilities for returned empties which when full were carried by them and will also carry empties where the "fulls" were delivered by road. Empties carried otherwise than by rail on their full journey are accepted for return by rail as merchandise and charged at merchandise rates and not at the returned empty rate.

The Trend of War-Time Earnings

Analysis of Audited Accounts

by S. HOWARD WITHEY, F.C.I., F.Comm.A., M.I.Ec.E.

THE gross earnings of £60,038 reported by the directors of *Berry Wiggins and Co., Ltd.*, oil refiners, etc., for the year ended December last, represents an improvement of £2715 in relation to 1942, and after charging taxation the balance of net profit is £25,478. This compares favourably with £22,483 shown in the previous account, and enables the dividends of 10½ per cent. on the "A" ordinary shares and 16.6 per cent. on the "B" ordinary shares to be repeated, and the forward balance to be increased by £2794. Registered privately in 1922 and made public in 1929, the company has an authorised capital of £580,000, all of which has been issued and fully paid. This consists of £215,000 in the form of 5½ per cent. cumulative preference £1 shares; £150,000 in 6 per cent. cumulative preference £1 shares; £165,000 in "A" ordinary shares of 5s., and £50,000 in "B" ordinary shares of 4s. The following is a summary of the final appropriation account covering the past year:—

	£
Brought forward from 1942 ...	85,968
Net profit: year ended December, 31, 1943	25,478
Profit adjustments, *less* tax for prior years	542
Disposable balance	£111,988
5½ per cent. dividend on £215,000 cum. pref. £1 shares £11,825	
Less income tax at 10s. in the £ £5912	5913
6 per cent. dividend on £150,000 cum. pref. £1 shares £9000	
Less income tax at 10s. in the £ £4500	4500
10½ per cent. dividend on £165,000 "A" ordinary 5s. shares £17,325	
Less income tax at 10s. in the £ £8662	8663
16.6 per cent. dividend on £50,000 "B" ordinary 4s. shares £8300	
Less income tax at 10s. in the £ £4150	
Carried forward to 1944	88,762
	£111,988

Subject to certain restrictions, the directors can borrow up to the amount of the authorised capital.

In the case of *Matthew Wells and Co., Ltd.*, oil refiners, the final figures are made up to the end of May, disclosing a net profit of £14,044, which compares with £13,399 in 1942-43, and the declaration of a final dividend of 12 per cent. makes 20 per cent. for the year, plus 2½ per cent. from the sale of a capital asset. This company was formed privately in 1914 and converted into a public concern in 1937, the entire authorised capital of £50,000 being in issue in the form of ordinary shares of 5s.

During the financial year to March 31 last, a trading profit of £16,397 was realised by *Handford Greatrex and Co., Ltd.*, tanners, and after debiting £9500 for tax the balance of net profit is £5047. This compares with £4384 shown in the previous account, when the sum of £12,000 was charged for taxation, and reduces the debit balance from £7180 to £2133. The company dates from 1897 and has an authorised capital of £90,000, all of which has been issued and fully paid up, comprising £40,000 in the form of 6 per cent. cumulative preference £1 shares—the dividend on which is in arrear as from April 1, 1931—and £50,000 in ordinary £1 shares which in 1922-23 received a dividend of 5 per cent.

The audited accounts submitted by *Wilson Brothers Bobbin Co., Ltd.*, manufacturers of wood chemical products, etc., covering the twelve months' operations to July 15 last, reveal a net profit of £26,588, representing an increase of £3996, compared with the previous year. This enables the dividend of 6 per cent. to be maintained, and the sum of £10,000 to be transferred to reserve, as against £5000 in 1942-43. Registered in 1900, the company also manufactures bobbins and shuttles, and has an authorised capital of £400,000, of which £285,000 has been issued and fully paid in ordinary shares of £1. After calculating the dividend at the gross amount, *i.e.*, without tax deduction, the forward balance shows a decline of £512, the final figures being made up as follows:—

	£
Brought forward from 1942-43 ...	1534
Net profit: year ended July 15, 1944	26,588
Disposable balance	£28,122
6 per cent. dividend on £285,000 ordinary £1 shares, gross	17,100
Transferred to reserve	10,000
Carried forward to 1944-45 ...	1022
	£28,122

The directors can borrow up to the amount of the authorised capital.

During 1943, sales of potash were well

maintained, but there was a decline of £99,527 in profits made by *Palestine Potash, Ltd.* This was due largely to a lowering of the price, a large proportion of the potash being sold to the Government at prices below the usual level. At £34,015 the royalties payable to the Palestine and Transjordan Governments show no material variation, but the provision for taxation was only £73,000, as compared with £177,000 in 1942, so that the balance of net profit shows little change at £11,136 after charging £55,000 for depreciation. The company has an authorised capital of £800,000, of which a total of £745,961 has been issued. This consists of £19,837 in 7½ per cent. cumulative redeemable preference £1 shares; £384,962 in 5½ per cent. cumulative redeemable participating preference £1 shares; £281,694 in ordinary £1 shares; and £95,468 in "A" ordinary £1 shares. After meeting the dividends on the preference shares, the forward balance shows an increase of £796.

After charging E.P.T., the gross earnings of *Evans Sons Lescher and Webb, Ltd.*, the wholesale and export druggists and manufacturers of pharmaceutical chemicals, etc., amounted to £99,579 in 1943. This compares very favourably with £54,853 in the previous year, but after debiting £47,550 (as against £30,445) for income tax, and £15,566 for debenture issue expenses the balance of net profit is £1049 lower at £18,061. Registered in 1925, the company directly controls Chas. Midgley, Ltd., the authorised capital being £450,000, of which a total of £365,497 ranks for dividend. This comprises £241,803 in 6 per cent. cumulative participating preference shares of 6s. 8d., and £123,694 in ordinary shares of 6s. 8d. on which the rate of dividend has been raised from 3 per cent. to 5 per cent. After allocating the sum of £7500 to contingency reserve, the forward balance shows an increase of £215, as shown below:

	£	£
Brought forward from 1942 ...		12,723
Net profit: year ended December 31 1943		18,061
Disposable balance		£30,784
6 per cent. dividend on £241,803 cum. pref. shares	£14,508	
Less income tax at 10s. in the £	£7254	7254
5 per cent. dividend on £123,694 ordinary shares ...	£6185	
Less income tax at 10s. in the £	£3093	3092
Transferred to contingency reserve		7500
Carried forward to 1944		12,938
		£30,784

During the twelve months ended May 31 last, the revenue of "*Sanitas*" *Trust, Ltd.*, totalled £64,438, which represents an increase of £847 compared with the previous year, and after debiting £4615 for taxation, the balance of net profit is £58,257. This compares with £58,224 in 1942-43, and the declaration of a final dividend of 7½ per cent. brings the total distribution on the ordinary capital up to 12½ per cent., as before. This company, which was registered in 1926, owns all the ordinary shares of the "Sanitas" Co., Ltd., manufacturers of disinfectants, soaps, etc., which owns one-half of the capital of W. Woodward, Ltd., the other half being held by the Trust which has an authorised capital of £593,000, all of which is in issue. This consists of £495,000 in 10 per cent. cumulative preference shares of £1—the dividend on which is paid half-yearly—and £98,000 in ordinary shares of 10s. each.

MANCHESTER RESEARCH

The Manchester Joint Research Council, with 14 representatives of the University and 16 of the Chamber of Commerce, held its first meeting last Monday in the council chamber of the University. The plan of work still has to be decided, but they are anxious to link up their efforts with research in other parts of the country.

In the course of the meeting, Mr. A. H. S. Hinchliffe (president, Manchester Chamber of Commerce) was appointed chairman, and Sir John Stopford (vice-chancellor, Manchester University) hon. treasurer. Mr. James Ainsley, secretary of the Chamber of Commerce is to be hon. secretary of the new joint council, with Mr. W. M. Cooper, of the University's Faculty of Law, as secretary. It was decided to approach the British Cotton Industry Research Association and the Department of Scientific and Industrial Research to name persons who would serve on the council as co-opted members.

CONSTITUTION OF SHELLAC

Necessity for the revision of the formula so far proposed for the chemical constitution of shellac is suggested by the study of Dr. B. S. Gidvani, now obtainable from the Lac Research Laboratory, 79 Grassmarket, Edinburgh, 1 (reprinted from *J. Chem Soc.*, 1944, p. 306). Suggested formulæ have regarded shellac as a condensation product of aleuritic, shellolic, and other unidentified hydroxy-acids in equimolecular proportions. Hydrolysis carried out by Gidvani's method, however, gave consistent yields of nearly 43 per cent. of aleuritic acid, and only 2.5 per cent. of shellolic. It is suggested that shellolic acid is not a primary product of hydrolysis, but is formed from unidentified acids or possibly from aleuritic acid itself.

LETTERS TO THE EDITOR

Penicillin Plant

SIR,—In the London *Evening Standard* for October 4 I read this passage: "I am told that the Distillers Company, with its enormous resources, is to take a hand in the production of penicillin. An almost exact replica is to be erected in the North of England of the world's largest plant, belonging to the Commercial Solvents Corporation at Terre Haute, on the Wabash River . . . . Equipment for the new British plant is being constructed in the United States and will be shipped over here."

Through you, Sir, I should like to put two questions to the Distillers Company:

(1) Is it true that the plant is being made in the U.S.A. and will be shipped over here?

(2) If so, is the Distillers Company aware that we have a growing chemical plant industry in this country which should be encouraged to the utmost in view of our post-war position?

Yours faithfully,

"CHEMICAL ENGINEER."

The External Graduate Again

SIR,—You were good enough, some few years ago (THE CHEMICAL AGE, 1934, *31*, p. 293; 1936, *35*, p. 294) to publish some letters of mine on the subject of equality of opportunity as it affects the chemist in industry. May I now try again without consulting my old manuscripts?

Firstly, let us admit that we are fortunate to have been kept out of the Forces and to have escaped the uprooting involved in transfers to jobs in Government factories. Having said that, I make the following observations from our particular vantage-point:

1. Approaching the age of forty one realises yet again that "the better the chemist, the poorer the chance of promotion," and one wonders whether to make a fresh start in some other profession or to throw self-respect to the winds and become a "blue-eye."

2. After a war-time lull, the Trainee menace shows signs of returning. These well-connected young men are given the considerable privilege of a lengthy and detailed tour of the factory, and before they have done a single day's work in their lives they are "starred" candidates for the limited number of good jobs available.

3. The policy of Big Business and the impact of the war have already effected a concentration of industry and reduced the number of administrative posts to a minimum.

4. After twenty years' connection with jam, cocoa, soap, rubber, or what-not, one is naturally restricted in one's search for another job; the operation of combines and trade associations almost puts one at the employer's mercy.

5. Now that there is a (war-time) improvement in the market for one's services, the employer—with notable exceptions—uses the powers of the E.W.O. with little scruple and much exaggeration in his description of one's exact functions. In many cases there has hardly ever been much relation to the country's war effort, and for a long time now the motive of post-war profits has "stuck out a mile."

6. In industries concerned fundamentally with chemical processes, it is not unreasonable to expect that the higher administrative positions would be filled by qualified chemists. Too often this is not so, and—apart from its effect on one's own distant prospects—one grows weary of the authority of the man who is "almost a gentleman and nearly a chemist" or the salesman who is aptly described as "half-pansy, half-thug."

7. There are few chances nowadays of starting a practice as consultant.

8. Chemistry does not yet offer very much beyond academic or industrial jobs; there is nothing like the number of State and civic appointments that are open to the lawyer, doctor, engineer or accountant.

9. The elderly worthies who represent us on the principal chemical bodies have done much to raise the general prestige of the profession but seem to be out of touch with the multitude of "have-nots" of the rank-and-file. After ten years or more of studying the hard way, these men come up against the old ungrammatical snag, "It's not what you know, but who you know that really counts."

10. To add to our present discontent, our employers have recently stated their intention of offering to Internal Graduates a salary which is about £100 per annum more than the salary of External Graduates with many years of service. This may be sheer opportunism on their part, but it seems provocative in the extreme, and if it is not scientific snobbery it smacks of an almost Gilbertian inverse proportion.

There may be plenty of room at the top, but the yes-men and the blue-eyed boys are pretty thick on the ground where the glittering prizes are handed out.

Here is one who hopes to find salvation in some poultry-farm or filling-station as soon as the war is over.—Yours faithfully,

"EXTERNAL GRADUATE" (B.Sc., F.R.I.C.).

The discovery of uranium at 1600 metres above sea level in one of the ravines of the Alaisk ridge, Kirghizia, will further increase the mineral wealth of the Soviet Union. This rare radioactive element is to be mined on an industrial scale after prospecting has been completed.

Personal Notes

At the last meeting of the Council of the Textile Institute, an inscribed silver rose-bowl was presented to MR. F. NASMITH, who retired in May, for reasons of health, from the position of honorary secretary, which he had held since 1930.

The University of London has appointed MR. HARRY BERRY, A.R.I.C., Dean of the College of the Pharmaceutical Society, to the chair of pharmaceutics, and DR. W. H. LINNELL, F.R.I.C., head of the College's department of chemistry, to the chair of pharmaceutical chemistry, both tenable at the Society's College.

DR. R. B. STRATHDEE, chairman of the Aberdeen and North of Scotland section of the Royal Institute of Chemistry, has been awarded the Territorial Decoration. Dr. Strathdee holds the rank of lieutenant-colonel on the General List of the Territorial Army in virtue of his appointment as O.C. Aberdeen University Contingent, S.T.C.

The Lord President of the Council has appointed MR. W. J. DRUMMOND, MR. H. L. GUY, D.Sc., C.B.E., F.R.S., SIR WILLIAM HALCROW, M.Inst.C.E., and MR. W. F. LUTYENS, to be members of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research from October 1. SIR JOSEPH BARCROFT, SIR HAROLD HARTLEY, and SIR FRANK SMITH retired from the Council on completion of their terms of office on September 30. Mr. W. J. Drummond is managing director of the Ashington Coal Co., Newcastle. Dr. H. L. Guy is secretary of the Institution of Mechanical Engineers and Associate Member of the Ordnance Board and of the Board of Chemical Warfare. Sir William Halcrow is a consulting civil engineer and principal of W. T. Halcrow and Partners. Mr. W. F. Lutyens is a director of I.C.I., Ltd.

The Joint Chemical Committee on Patents, whose findings are dealt with in our leading article this week, is constituted as follows: *Association of British Chemical Manufacturers*—MR. C. HOLLINS (chairman) (I.C.I., Ltd.); MR. E. H. BRITTAIN (Distillers Co., Ltd.); DR. G. H. FRAZER (Therapeutic Research Corporation of Great Britain, Ltd.); DR. J. A. LLOYD (Courtaulds, Ltd.). *Biochemical Society*—PROFESSOR E. C. DODDS. *British Association of Chemists*—DR. G. E. FOXWELL. *Chemical Society*—PROFESSOR J. T. HEWITT. *Institution of Chemical Engineers*—DR. HERBERT LEVINSTEIN. *Royal Institute of Chemistry*—DR. J. G. FIFE. *Society of Chemical Industry*—MR. H. W. ROWELL. *Wholesale Drug Trade Association*—MR. A. MORTIMER. MR. ALLAN J. HOLDEN serves as secretary. Mr. Hollins, Dr. Levinstein, and Dr. Fife are to give evidence before the Board of Trade Committee.

BELGIAN INDUSTRY TO-DAY

Certain facts and figures about the state in which Belgium has been left by the Germans have just reached this country. As regards the mining and chemical industries (*see* also THE CHEMICAL AGE, September 9) reports show coal output to be about 50 per cent. below normal; the scarcity of timber for pit-props being the chief bottleneck. As regards metals, although the invaders, in their retreat, could not remove all steel, they stripped Belgium of all stocks of zinc and other non-ferrous metals.

There is a serious lack of bicarbonate of soda and an even graver deficiency of sulphuric acid, the output of which declined to 10 per cent. of the pre-war level. Paper requirements aggregate 4000 tons a month and the country has stocks for only two months, owing to the lack of wood. The textile situation is also reported to be serious. No doubt, with the hoped-for restoration of postal and business relations with Western Europe, supplies of industrial chemicals should again become more plentiful.

SHALE OIL RESEARCH

It is reported from Washington that experts of the U.S. Navy Department, in co-operation with the scientists of the Bureau of Mines and Geological Survey, are planning an extensive research programme into the possibilities of oil-from-shale production. The main aim will be to determine whether specification fuels can be obtained from oil shale or coal in large-scale quantities. Supplementary to this will be the knowledge gained on the changes that may prove necessary in ships' engine designs. While the price of the fuel will be of some concern, the research will be more concerned with perfecting a synthetic process, and may also result in the development of a synthetic lubricating oil.

The Antofagasta Mining Association, Chile, in a communication addressed to the President of the Republic, declares that pessimism arising from the competition of synthetic products with natural nitrate of soda is unjustified and that apart from nitrate, there are many other natural resources (*e.g.*, copper oxides; sulphur; carbonate of lime; sodium sulphate; aluminium sulphate; magnesium sulphate; sodium chloride; kieselguhr; onyx; and calcium sulphate) which, with proper development, could serve as the basis of an important chemical industry in Chile.

Penicillin Production

C.W.U. Members Demand an Inquiry

A DEMAND for an official inquiry into the system of penicillin manufacture in this country was expressed at a conference in Manchester last Sunday, attended by members of the Chemical Workers' Union who are employed by I.C.I. and are themselves engaged in the production of the drug. Mr. Dick Beech, national chairman of the C.W.U., was in the chair. The general view was that there was something seriously wrong with penicillin production in Britain, for, although penicillin was discovered by British scientists and was first produced here, America to-day claims to control 95 per cent. of the world's output.

It was further resolved that an inquiry should be made into the effect of international cartels on post-war chemical production, with a view to ending any artificial restrictions on the industry. Another resolution which was adopted expressed the opinion that M.O.S. factories at present operated by I.C.I. technicians should not be handed over to private enterprise, but should remain as Government establishments.

New Canadian Processes

Ammonium Chloride

CANADIAN INDUSTRIES, LTD., have just revealed the development by their research department of a new process for the manufacture of ammonium chloride and sodium sulphide. The process has been utilised commercially for some time by C. I. L.'s Hamilton (Ontario) plant and has proved to be more economical than conventional methods. The method entails passing sulphur dioxide and ammonia into an ordinary brine solution, with the consequent formation of ammonium chloride and sodium sulphite. The latter precipitates out and the ammonium chloride may be readily recovered from the mother liquor, before re-cycling.

Oxidation of Ethylene

A process for the vapour-phase oxidation of ethylene to ethylene oxide, in the presence of methane or ethane, with air, over a new type of silver catalyst, has been developed by the National Research Council of Canada. Catalytic oxidation of ethylene to ethylene oxide has so far been successful only when substantially pure ethylene was used as the feed. The new method makes possible the use of readily available hydrocarbon fractions, such as oil refinery absorber residue gases, containing as little as 10 per cent. ethylene, without the necessity for the costly isolation of ethylene.

The critical problem in ethylene oxidation is the control of the temperature of the catalyst surface, in order to prevent complete oxidation to carbon dioxide and water —a problem which is even more acute in methane-ethane-ethylene mixtures. However, the present process renders possible the close temperature control of the new type of catalyst, and the addition of controlled amounts of ethylene dichloride to the reactor feed suppresses the oxidation of the paraffins and permits the economical production of ethylene oxide.

The process has been successfully tested on a laboratory scale at a Canadian refinery over a period of seven months. A pilot plant to produce 200 lb. of ethylene oxide per day is now being designed.

CANADA'S PENICILLIN

Canadian production of penicillin is now on a commercial scale at two Government-owned units, operated by Connaught Laboratories, Toronto, and Averst, McKenna, and Harrison, Ltd., Montreal. Both these Government plants are utilising the flask method, and the entire output is at present being supplied to the armed forces.

A third Canadian unit, the first privately financed, was completed and brought into production by Merck and Co., Ltd., during August. The Merck project, which incidently was in operation within six weeks of the date of installation of the first piece of equipment, is a deep tank producer and employs the sterile soil means of maintaining a master culture.

Although total output of the three units is being devoted to military needs, a limited quantity of penicillin imported from the U.S.A. has recently been made available for civilian purposes.

CORNISH MINERALS

In the mid-19th century there was much varied activity in Cornwall, and now, as a result of a discovery, it is stated there is a prospect of a revival. A grandson of one of the pioneers of the old mining at North Hill has discovered and, with the help of friends, opened up a deposit of wolfram and tin which is said to be valuable. Sir Arthur Russell, the geologist, has visited the mine, which is being worked, and has identified two other rare minerals only once before recorded in Cornwall, and then only in small quantities, whereas on this property they appear to be abundant.

Chile's ethyl alcohol production increased from 174,365 mg. in 1940 to 2,945,389 mg. in 1943.

Greece's Mineral Wealth

Chemical and Mining Industries Surveyed

from a Correspondent

THE welcome news that, three years after the withdrawal of British and Dominion Forces from Greece, units of Land Forces, Adriatic, have landed again on the mainland of Greece, brings the day nearer on which the gallant Greek people, who, undaunted by long years of cruel suffering, have never ceased to offer heroic resistance to the invader, will be able to turn to the task of reconstructing their liberated land. In view of the close historical, political and economic associations between the British and the Greek peoples, our readers will, no doubt, be interested in the following survey of Greece's chemical and mineral extracting industries.

Lignite and Ores

The most important minerals of Greece are lead, manganese, pyrites, salt, emery and marble; for, although there are large deposits of lignite in Greece, they are of an inferior kind and a poor substitute for bituminous coal or anthracite. Greek lignite is mostly used for briquettes, as it readily decomposes into powder when exposed to air. The deposits are distributed in several areas. The largest quantities are mined at Tymi and Aliverion, while the Drama region contains the most extensive reserves; there are other deposits near Lamia and Thermopylae, and in the Ptolemais district, between Kozane and Florina. It is significant that lignite output was stepped up considerably during the war. Annual output amounts now to 150,000 tons, as compared with a pre-war figure of only 35,000 tons. It is hardly surprising that the Hermann Göring combine took a leading interest in lignite mining; however, no information has been received in this country showing that Greek lignite has been used in the production of synthetic oil. It seems that the increased output was used for home consumption, partly replacing coal supplies from abroad. Furthermore, some hard coal was recently discovered in Chios and Euboea.

Iron ore is found in small quantities at Lavrion and in a number of widely scattered localities. However, as Greece is lacking the high-grade coal necessary for smelting purposes, almost the entire production of iron ore was exported to Britain, the Netherlands and Belgium. Output of the pyrites mines at Kassandra could, it is contended, be made greater use of, as the ore is free from arsenic and has a sulphur content of 50 per cent. Output of pyrites totalled 210,000 tons in 1937, and rose to 270,000 tons in 1939, the latest year for which statistics are available. The iron ores of Seriphos and Kythnos contain manganese, and those of Tsuka chromium. The leading company, "Etairia Lipasmaton," in which the I.C.I. has an interest, exploits most of the mines. About a quarter of the pyrites mined is used for production of sulphuric acid—aggregating some 35,000 tons before the war—for artificial fertilisers, while the remainder is exported. The electrolytic smelting of hematite and limonite was planned at the outbreak of war, using the water power of the Acheloös.

Oil

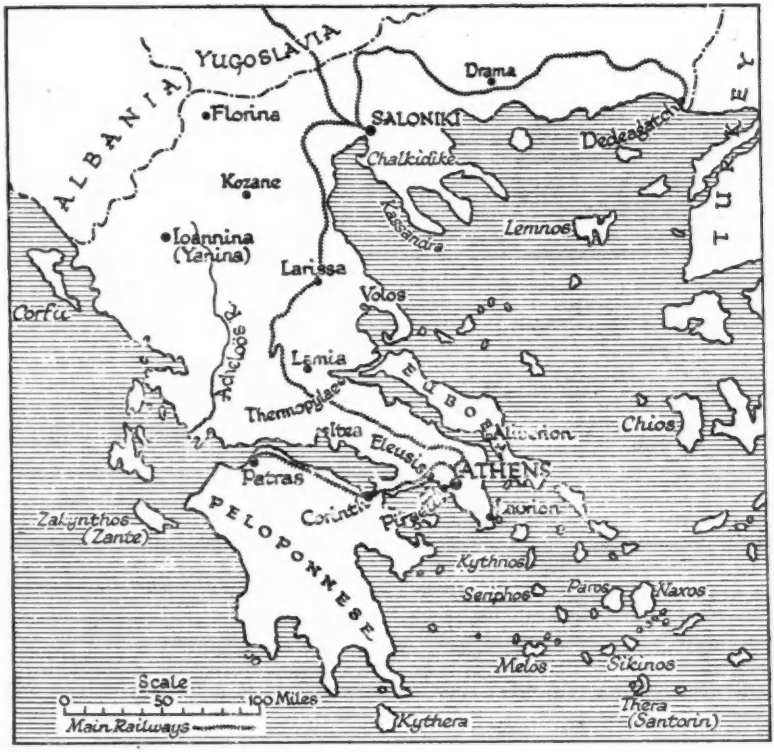
Petroleum has been found in limited quantities on the island of Zante (Zakynthos) and at Dragopsa, near Yanina, and bitumen, bituminous limestone, and asphalt occur in Crete and on a few other islands, in Macedonia, and in Epirus. During the last war the French military authorities were successful in locating many wells and reported that the geological structure justified exploitation. However, prospects of commercial production of oil in Greece are small.

Emery

Greece is one of the few sources of emery in the world, and the purity of the local product exceeds that of the deposits in Asia Minor and the U.S. Especially notable are the deposits on the islands of Naxos, Sikinos, and Paros, the most important being in the north-east of Naxos—hence the name *naxium* applied to emery by Pliny. On the completion of the proposed hydro-electric power station, Naxos emery is to be used, in combination with bauxite, for the production of artificial grinding and polishing tools in electric furnaces.

The mines of silver-bearing lead ore near Lavrion were already exploited in ancient times. The lead was always smelted on the spot and shipped in a refined state, the country supplying about 2 per cent. of the world's lead production. Zinc ores also occur at Lavrion in the form of smithsonite ($ZnCO_3$) and sphalerite (ZnS), containing about 25 per cent. of zinc, and in flotation concentrates about 45 per cent. Manganese ores, such as rhodochrosite ($MnCO_3$) and pyrolusite (MnO_2), are found in quantity in the Lavrion district, especially at Zerbissia, while chromium and molybdenum ores occur in Thessaly and in Chalkidike. Interest has recently been taken in nickel deposits found at Locris and on the island of Euboea. As a result of an agreement between the Greek

Government and a London corporation, the latter established in Greece a plant with an annual capacity of 500 tons of pure nickel, the Greek Government receiving a royalty. Output of nickel ore rose from 50,500 tons



The Location of Industry in Greece

in 1937 to 60,000 in 1939; that of chrome ore averaged about 45,000 tons per annum before the war, while zinc ore fell from 10,000 tons in 1937 to 5400 in 1939. Copper from ore mined near Larissa, amounting to 300-400 tons a year, is used exclusively for the production of copper sulphate. Antimony production amounted to only 100 tons yearly.

It is worth while pointing out that since the Turkish agreement with the United Nations to stop all chrome deliveries to Germany, Balkan supplies have accounted for Germany's entire supply of chrome, and this, too, has now been entirely cut off.

A future light-metal industry might benefit from the large magnesite deposits on Euboea and in Chalkídike as soon as the question of cheap electric power has been solved. Output of crude magnesite increased from 161,000 tons in 1937 to 168,000 tons in 1938. A British company, the Société Anglo-Grecque de Magnésite, was engaged in this industry.

Bauxite occurrences in central Greece, in the Delphi district, were on the way to supplying new aluminium plants at Itea, on the Gulf of Corinth. The bauxite contains 56 per cent. Al_2O_3, with low silicon and titanium contents. Bauxite mined at Eleusis, containing a high proportion of iron and silicon, was used for cement production. As in the case of lignite, the German invaders paid great attention to Greece's bauxite deposits. Indeed, even before the war, output was on the upgrade, having risen from 137,000 tons in 1937 to 179,000 in 1938 and 187,000 in 1939. Since last April, however,

there has been no production, as the mines were wrecked by a partisan raid. The loss of the Greek—and, even more, of the Yugoslav—bauxite supplies is of importance, now that Germany has ceased to receive any from France or the Gárgano peninsula of Southern Italy.

Salt Deposits

Salt is found in scattered localities, the chief deposits being on both sides of the Gulf of Salonika and near Volos. Recovery of salt, like the production of emery and petroleum, is controlled by the Government. Salt production amounts to 100,000 tons annually. Worth mentioning also is the sulphur on the island of Melos, used in the production of insecticides, and that of pozzolana or Santorin earth, which serves as a natural cement utilised in the construction of light houses, bridges, and other water-resisting structures.

As Greece's economy is predominantly agricultural, a certain number of vegetable products are naturally used in her chemical industry. Important is the production of soap from olive oil of too high an acidity for food purposes, or from crushed olive stones. Soap made from the former is white, from the latter, green. There were about 130 small establishments in Greece, making about 25,000 tons of soap annually for home consumption and export. Other rural products of importance are turpentine and colophony from *Pinus halepensis* (the Aleppo pine). Production of resins amounted to more than 15,000 tons yearly. The pure turpentine, mixed with 2 per cent. ether, is used as a substitute for benzene.

Greece's chemical industry is not yet much developed because she is handicapped by a paucity of energy resources and industrial raw materials, her plant capacity is not extensive, she has few workers, and her home market is limited. The principal establishments manufacture, besides soap, fertilisers and ceramics. The production of fertilisers is centred round the Piraeus. Tanning and leather manufacturing are also of importance. The leading chemical firms are the "Etairia Chemicon Proionton kai Lipasmaton," turning out inorganic chemical products, with works in Dropetsona, Piraeus; and the "Electrochemical Industry," which is connected with the Solvay group and produces caustic soda, soda, hypochlorites, etc. Inorganic dyestuffs, mainly chrome products, and some organic dyes are produced by the "Chromaturgia Pireos," which received supplies of intermediates from Germany. An artificial silk industry, using the viscose process, was started in Athens in 1926. Two works exist for explosives and three companies, "Chromaturgia," "Spes" and "Damvergis," produce pharmaceuticals. The value of the products of the chemical industries amounted to about £2,000,000 a year and rank third in importance among Greece's manufacturing industries. The possibilities for the development of Greece's mining and chemical industry, however, are by no means exhausted, for the successes obtained so far promise favourable results for the future.

At the International Economic Conference in Geneva, 1927, Greece appealed for help and the principal recommendation of this body of experts on industry was the adoption in all industries of more efficient methods as a starting point for reducing the costs of production and improving conditions of labour. After the set-backs of the present war, the United Nations will surely help their gallant Greek ally to overcome her difficulties, to rebuild her industries and to introduce the manufacture of new products.

A CHEMIST'S BOOKSHELF

MODES OF DRUG ACTION. London: Gurney and Jackson. Pp. 127. 15s.

This general discussion, reprinted from the Transactions of the Faraday Society (September, 1943), deals with both the biological and the physico-chemical aspects of the subject. Fourteen contributors have contributed the results of their studies of the effects of chemical substances on different vital activities and explain how these are modified, suspended, or abolished by what may be called pharmacological action explained with the help of physical chemistry. An interesting example is the account of the fascinating activity of tetramethylammonium salts, similar to that of nicotine, cystine, and lobeline, and of other natural alkaloids, which are not remarkably similar to one another in molecular configuration. Some papers deal with synthetic chemical substances and others with natural, mainly vegetable, drugs. Each lecture is followed by an exhaustive discussion in which, to quote the presidential address of Sir Henry Dale: "Abundant evidence was given of the different kinds of technique and the different orders of conception which are now being brought to bear, in a convergent attack, on a problem to which, even quite recently, the only method of approach seemed to be that of hit or miss, an empirical and almost undiscriminating trial of any accessible derivative of a substance in which, whether by planned investigation or sheer accident, a particular type of activity had been discovered." The book contains many useful tables and references to literature. It is noteworthy that the Therapeutic Requirements Committee of the Medical Research Council has recently issued a list of 26 drugs recommended for increased production in the United Kingdom, many of which are discussed in these proceedings.

Parliamentary Topics

Penicillin

Colonel Lyons asked the Minister of Supply what steps had now been taken to secure mass production of penicillin.

Sir Andrew Duncan: Seven plants, six of which are pilot plants, are at present producing penicillin in this country. Nine large-scale plants are expected to come into operation at various dates within the next six months. Two of them are about to start production.

Colonel Lyons: Is the Minister cognisant of the rapid strides made in America and Canada in the use of this very valuable drug? Can he not co-operate with the authorities there to get some machinery here?

Sir A. Duncan: We are in the closest touch with organisations in America and Canada and we have the active assistance of one of the American firms in one of the plants that we are putting up.

Scientific Research Apparatus

Mr. Salt inquired of the Minister of Labour what arrangements were made to assess the labour requirements of firms manufacturing scientific research apparatus and whether, in view of the need of freeing industrial research at the earliest opportunity from all unnecessary impediments, he would reconsider the existing restrictions imposed on the supply of labour.

Mr. Bevin replied that no particular restrictions were imposed on the supply of labour to makers of scientific research apparatus.

Potash Supplies

Mr. Salt asked the Minister of Supply to what extent the supplies of potash for agricultural purposes in this country were being obtained from industrial waste products; and whether any steps were being taken by his Department to encourage such processes.

Mr. Peat (in a written answer): Industrial waste products, mainly flue dust, provide only a small proportion of the supplies of potash for agricultural purposes. Full consideration led to the conclusion that the erection of plant for the extraction of the potash would not be justified, but flue dust may be purchased by farmers without restriction and in addition to their normal potash ration.

Nigerian Tin Mining

Mr. Creech Jones, who asked the Secretary of State for the Colonies regarding conditions in the tin mines of Nigeria, was informed that future policy was under review.

Dust in Steel Factories

Mr. Higgs asked the Minister of Labour what steps he proposed to take to give effect to any of the recommendations of the Committee on Dust in Steel Factories.

Mr. Bevin: I am making every effort to deal with this matter comprehensively, and regulations are in course of preparation in respect of the recommendation.

General News——From Week to Week

I.C.I. factories' contribution to the Salute the Soldier campaign reached over £2,300,000, of which nearly £700,000 was in small savings.

A dance recently held for the benefit of our merchant seamen, by the employees of I.C.I. (Alkali), Ltd., Northwich, Cheshire, realised the useful sum of £19 5s. 3d. for the Merchant Navy Comforts Service.

The complete reference No. 8, at the end of Mr. Liddiard's article on "Application of Alkaline Silicates," is to Liddiard and Harwood, "The Rinsing of Alkalis from Glass Surfaces," *Dairy Ind.*, 1944, 7, pp. 488-494 (*see* THE CHEMICAL AGE, October 7, p. 345).

The Petroleum Order, 1944 (S.R. & O. 1944, No. 1141), which comes into force on November 1, revokes the Petroleum (No. 3) Order, 1940 (S.R. & O. 1940, No. 962), which regulates the supply and storage of petroleum and other substances capable of being used as fuel and lubricants for motor vehicles.

Fuel Efficiency Bulletin No. 35, issued by the Ministry of Fuel, explains the necessity for boiler blow-down. It gives a useful guide as to the best time to blow down, and describes routine control and the prevention of priming. The value and use of the hydrometer in testing samples of boiler water is dealt with and a section on heat recovery from continuous blow-down is included.

For the first time a Trading with the Enemy Order contains noticeably more deletions than additions. In the Trading with the Enemy (Specified Persons) (Amendment) (No. 12) Order, 1944 (S.R. & O. 1944, No. 1104), there are three pages of deletions from the list of traders in neutral countries with whom dealings of any kind are unlawful, and only two pages of additions. Among the latter is Chemische und Pharmaceutische Produkte A.G., Bahnhofstr. 23, Zurich, Switzerland.

The Widnes battalion of the Home Guard claims to have been the first to produce its own "Molotov Cocktails." These were manufactured by Peter Spence & Sons, Ltd., and for some time were on the high priority list of that company's work.

A conference on industrial education has been arranged by a group of Scottish members of the British Association for Industrial and Commercial Education. It will be held on October 27 in the Glasgow and West of Scotland Commercial College. The hon. organising secretary is Mr. J. B. Frizell, City Education Officer, Edinburgh.

Foreign News

The Argentine Government has formed a Secretariat of Industry to co-ordinate the national economy with a view to the post-war situation.

Refractory chromite production was increased recently at Punta Gorda, Cuba. Shipments from here go normally to the United States.

Two companies at St. Lawrence, Newfoundland, achieved an output of 72,940 tons of fluorspar in 1943, an eight-fold rise over that of 1941. The output of these two properties is estimated at 95,000 tons in 1944.

The New Zealand Institute of Plastics, states a Reuter message, has been formed by plastics manufacturers in the Dominion, with the purpose of promoting the development of the industry through domestic and foreign research.

Helium for war uses in the U.S. is produced for less than two cents a cubic foot and at ten times the pre-war volume. Twenty-five years ago the price was $12,500 a cubic foot. Five plants are now producing helium.

A research laboratory has been established in Germany for the utilisation of waste obtained in the mining of oil shales. It was found that by briquetting it and by slowly burning the briquettes most of the shale oil can be recovered.

Ruhr synthetic oil plants at Bottrop and Sterkrade were attacked by the R.A.F. last Saturday. Air reconnaissance revealed that the oil refineries at Neu Schwechat and Lõbau, near Vienna, recently attacked by U.S. heavy bombers, were very severely damaged.

Output of chemical products in the western regions of the Soviet Union has increased 250 per cent. since the outbreak of the war. In addition to the 15 plants in operation before the war, 13 new factories have been established. The State plan was fulfilled in 1943 and the cost of production reduced more than 8 per cent. Substitution of plastic parts for metal ones in war industries saved 38,000 tons of metal in 1943.

In Portugal, the Minister of Finance issued a decree according to which import duties on pharmaceutical products were either reduced or waived until the end of the year. Imports have to be made through the Commissao Reguladora dos Productos Quimicos e Farmaceutices.

A list of publications on DDT from 1874 to April 30, 1944, inclusive, has been prepared by R. C. Roark, Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture, Washington D.C., as a 12-page mimeographed bulletin that includes 174 publications.

To encourage the development in Germany of new uses for thorium, zirconium, and the rare earths, prizes are being offered by the Auer Research Endowment, the foreign press reports. Useful new methods for the preparation of the rare earth metals or their compounds are also rewarded with prizes.

Import duties and other customs charges on penicillin, either in substance or in preparations for therapeutic use, are suspended for a period of six months in Brazil. The National Service of Fiscalisation of Medicine is supervising the use and distribution of penicillin in co-ordination with the State health departments.

Recovery of aluminium from scrap in the United States amounted to the huge total of 313,961 short tons in 1943, according to the Bureau of Mines, compared with 196,464 tons in 1942. The figure, almost six times that of a normal pre-war year, was attributable to new industrial scrap from war production.

Standard Oil of Louisiana and Standard Oil of New Jersey have reached an agreement to consolidate at the end of this year. Standard of Louisiana is a subsidiary of Standard of New Jersey, which is the operating unit of Standard Oil Co. (N.J.). No material change in the organisation at Baton Rouge is contemplated.

An Argentine company has recently been formed with Government participation with the object of installing two or more smelting copper plants, using ore from the Province of Mendoza. Furthermore, plants for the extraction of metallic copper are also to be erected. It is proposed to arrive gradually at a production of the 12,000 tons of fine copper required annually by Argentina.

The Government of Brazil's approval is required for the establishment of new factories for the manufacture of sheet glass, according to a recent decree-law. The customs duties on imports of plain white flat glass have been doubled, and the increased duties are applicable to shipments already in the customs awaiting clearance. Opaque flat glass has been maufactured in Brazil for same time, but the domestic manufacture of sheet glass began only recently.

Tests for agricultural uses of DDT are being conducted in a number of laboratories by the U.S. Bureau of Entomology and Plant Quarantine with the limited quantities of DDT now available for experimental purposes.

In South Africa more attention is being paid in the chemical industry to the treatment of water, in which modern laboratory control methods are followed. Samples of water from all parts of the Union have been analysed and information on water problems and their constant supervision are being made available.

According to the annual report of the South African Torbanite Mining and Refining Co., Ltd., 128,451 (130,488) tons of torbanite were extracted, yielding 6,050,196 (6,039,464) gallons of oil. The company decided to double the retorting capacity of its plant at Ermelo mine, to be completed by the end of 1946.

Production of common salt in Canada in 1943 totalled 687,686 short tons valued at $4,379,378, compared with 653,672 short tons worth $3,844,187 in 1942, the Dominion Bureau of Statistics reports. Both quantity and value were the greatest ever realised by the Canadian salt industry. Half the output was consumed directly in the manufacture of caustic soda and other chemicals.

Recent prospecting has established the existence of important deposits of black sand on the coast of Queensland, Australia, between Southport and Coolangatta, a distance of 20 miles. Three mineral leases and 30 dredging claims have been entered. The chief mineral constituents of the sand are: zircon, 40-45 per cent.; rutile, 30-35 per cent.; ilmenite, 20 per cent.

To ensure that no part of the United Nations ammunition-filling programme shall suffer from shortages of chemicals and explosives, a sub-committee of the Joint War Production Committee of the U.S. and Canada with their advisers, met in Montreal last month. The Canadian section of the committee was headed by Mr. J. R. Donald, director-general of the chemicals and explosives production branch of the Department of Munitions; the American section by Gen. R. E. Hardy, chief of the ammunition branch, industrial division, U.S. Ordnance (Army); while the United Kingdom was represented by Dr. J. W. Armit, director-general of explosives, Ministry of Supply.

Forthcoming Events

A joint meeting of the South Wales section of the **Royal Institute of Chemistry** with the Swansea branch of the **Association of Scientific Workers** takes place, on **October 14,** at University College, Swansea, at 3 p.m. Mr. G. E. Coates will present a paper entitled "Some Applications of Nuclear Physics."

The Agricultural Group of the **Society of Chemical Industry** meets on **October 17,** at 2.30 p.m., at Burlington House, to hear a paper on "Soil Insecticides," by Dr. H. C. Gough, of Leeds University.

A joint meeting of the Edinburgh sections of the **Chemical Society,** the **Royal Institute of Chemistry,** and the **Society of Chemical Industry,** with the **Edinburgh University Chemical Society,** will take place on **October 17,** at 7 p.m., in the Medical Chemistry Lecture Theatre of the University. Professor G. F. Marrian, F.R.S., will lecture on "Some Aspects of Heroid Metabolism."

The North-Western section of the **Institute of Fuel** meets, on **October 18,** at the Engineers' Club, Manchester, at 2.30 p.m., to hear Mr. G. N. Critchley deliver the second paper in the series on thermal insulation on "The Economics of Saving Fuel with Particular Reference to the Insulation of Steam Ranges."

The **British Association of Chemists** (London section) has arranged for a public meeting to be held at the Wigmore Hall, at 6.30 p.m., on **October 18,** to discuss "The Safeguarding of Key Industries." Mr. Norman Sheldon, A.R.C.S., F.R.I.C., chairman of the Safeguarding of Key Industries (Scientific Equipment and Materials) Committee, will open the discussion by proposing a resolution urging the Government to give immediate and special consideration to the maintenance and development in Great Britain of those industries formerly covered by the Safeguarding of Industries Act (Part 1). Members of every scientific society are urged to attend. Anyone who would like to take part in the discussion and would care to have advance information of the proposals which will be put forward is invited to write to the Safeguarding of Key Industries Committee, 19 Charing Cross Road, London, W.C.2.

The Leicester section of the **Institution of the Rubber Industry** meets, on **October 19,** to hear Dr. G. Gee read a paper on "The Behaviour of Rubber in Mixed Liquids."

The Chemical Society meets on **October 19,** at 2.30 p.m., at Burlington House, when Professor Wilson Baker, M.A., M.Sc., Ph.D., will deliver the Tilden Lecture on "Non-Tensenoid Aromatic Hydrocarbons."

The Newcastle section of the **Society of Chemical Industry** meets on **October 19,** at 5.45 p.m., in King Edward VII School of Art, Lecture Theatre, King's College, when Mr. J. Brown will deliver a lecture on the "Assay of Coal for Carbonisation Purposes."

The Road and Building Materials Group of the **Society of Chemical Industry** will meet on **October 19,** at 5 p.m., at Gas Industry House, 1 Grosvenor Place S.W.1, when a paper entitled "The Substitution of Coal Tar Pitch for Asphaltic Bitumen in Building Mastic," will be read by Mr. D. C. Broome.

The annual general meeting of the **British Rheologists' Club** will be held on **October 21,** at 2.30 p.m., at the University, Reading. Papers on "The Measurement of Tack" will be read by Dr. N. A. de Bruyne and Dr. R. F. Bowles.

The Leeds area section of the **Royal Institute of Chemistry** holds a joint meeting with Leeds University Chemical Society on **October 24,** when Professor J. W. Cook, D.Sc., F.R.S., F.R.I.C., will deliver a lecture on "Some Chemical Aspects of Cancer Research."

The Midland section of the **Institute of Fuel** meets on **October 25,** at the James Watt Memorial Institute, Birmingham, at 2.30 p.m., to hear a précis, followed by a discussion, on "Superheaters for Water Tube Coal Resources," by Mr W. J. Skilling and Dr. M. McGregor.

The Council of the **Institution of Chemical Engineers** announces that the fifth Hinchley Memorial Lecture will be given by Sir Alexander Gibb, O.B.E., C.B. (Past-President), on **October 27,** at 3 p.m., at the Institution of Civil Engineers, Great George Street, S.W.1, the subject being "Hydro-Electric Development in Great Britain and its Influence on Chemical and Allied Industries."

The **Association of Austrian Engineers, Chemists and Scientific Workers in Great Britain** meets on **October 29,** at 11.30 a.m., at the Austrian Centre, 63 Eton Avenue, N.W.3, when Dr. F. Berzel, Director of Research, Roche Products, Ltd., will deliver a paper on "Life Saving and Life Preserving Plant Products."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Order Made on Application for Discharge

EDWARDS, HARRY DEREK, 4 Newbury Road, Newbury Park, Ilford, Essex, research chemist. (O.M.A.D., 14/10/44.) Application adjourned for twelve months, with liberty to apply.

Companies Winding-up Voluntarily

NORTH-EASTERN REFRACTORIES, LTD.; NORTHERN REFRACTORIES, LTD.; SCOTTISH REFRACTORIES, LTD.; SHEFFIELD REFRACTORIES CO., LTD. (C.W.U.V., 14/10/44.) By special resolution. September 26. William Arthur Cutts, Genefax House, Sheffield, appointed liquidator in each case.

Receivership

A. U. PRODUCTS, LTD. (R., 14/10/44.) C. N. Baker, Stanbrook House, 2/5 Old Bond Street, W.1, appointed receiver on September 16, under powers contained in debenture dated May 16, 1940.

Company News

Newton Chambers and Co., Ltd., announce an interim dividend of 5 per cent. (same).

The Burmah Oil Co., Ltd., has declared an interim dividend of 2½ per cent., (same).

Major & Co., Ltd., announce an interim dividend of 6 per cent. (same).

Thorncliffe Coal Distillation, Ltd., report, for the year ended June 30, a loss of £36,190 (profit of £21,830).

F. S. Cleaver and Sons, Ltd., soap manufacturers, etc., Unilever House, Blackfriars, E.C.4, have changed their name to Industrial Soaps, Ltd.

Tht Electrolytic Zinc Company of Australasia, Ltd., reports a dividend of 5 per cent. (same) on preference and ordinary shares for the half-year ended June 30, making 9 per cent. on both classes.

Bryant and May, Ltd., repeat the interim dividend of 8 per cent., on the ordinary stock, and the interim of 5 per cent. on the partnership stock for the half-year ended September 30, 1944.

Oxley Engineering Co., Ltd., have made a trading profit, for the year ended June 30, of £36,876 (£23,905). Net profit: £13,094 (£12,271). The dividend on the ordinary shares remains at 15 per cent.

The Anglo-Iranian Oil Co., Ltd., announce a net profit, for the calendar year 1943, of £5,639,122 (£7,790,282); tax provision is £2,798,764 (£4,917,846). Total assets: £78,995,130 (£70,984,030). Carry forward: £1,419,055 (£1,378,667). The company maintained its ordinary dividend of 20 per cent.

New Companies Registered

Wilmot Mansour & Co., Ltd. (389,866).—Private company. Capital: £5000 in 100,000 shares of 1s. each. Pneumatic, hydraulic, chemical and general engineers, etc. Subscribers: A. R. Humphrey, C. F. Cherry. Registered office: 4-5, Staple Inn, London, W.C.1.

Culpar Products, Ltd. (390,107).—Private company. Capital: £1000 in £1 shares. Manufacturers and dealers in chemicals, solvents, bleaching preparations, drugs, dyes, etc. Directors: A. B. Cliff Graythorne; D. H. Partington. Registered office: Chronicle Building, Corporation Street, Manchester.

Kilvenite Ltd. (389,972).—Private company. Capital £1000 in 1000 shares of £1 each. Miners, quarriers, and manufacturers of and dealers in lime, phosphate, clay, sand, oils, mineral and chemical salts, refractory materials, fertilisers, etc. Directors: M. Thomson, J. W. Thomson, R. Edwards. Registered office: 1 Laurence Pountney Hill, London, E.C.4.

Biorex Laboratories, Ltd. (390,233).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers, exporters and importers of and dealers in chemicals, drugs, disinfectants, fertilisers, oils, colours, polishes, soaps, proprietary articles, etc. Subscribers: H. Baker; Phyllis M. Smith. Registered office: 65 Uffington Road, London, S.E.17.

Ingo Chemicals, Ltd. (390,115).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of and dealers in chemicals for dry cleaning, toilet preparations, perfumes, drugs, disinfectants, fertilisers, etc. Subscribers: M. Measing; Clara Mandler. Utacti Products, Ltd., Gresse Buildings, Stephen Street, W.1, are the first directors. Registered office: Gresse Buildings, Stephen Street, London, W.1.

Chemical and Allied Stocks and Shares

STOCK markets were steady but only slightly active during the week, and movements on balance were mostly small. British Funds continued to show an upward trend, and the general tendency in industrial shares was firmer. Imperial Chemical strengthened to 38s. 3d., Distillers to 104s. 9d., United Molasses to 36s. 6d., and British Plaster Board were 38s. 6d. Following their advance, there was a little profit-taking in Lever & Unilever, which moved back to 44s. 3d. xd, with Lever N.V. lower at 45s. Dunlop Rubber showed firmness at 46s. 3d. Barry & Staines were 52s., and Nairn & Greenwich improved to 72s. 6d.

The iron and steel section was steady, with Tube Investments 96s. awaiting the dividend announcement. United Steel were 24s. 4½d. xd., and Neepsend 31s. 6d. xd. Dorman Long were 26s. 9d., Babcock & Wilcox 49s. 9d., Guest Keen 37s. 3d., and Stewarts & Lloyds 54s. 7½d. Among shares of companies with interests in plastics, De La Rue moved higher at 192s. 6d., and Erinoid kept steady at 11s. 3d. awaiting the results, but British Industrial Plastics 2s. shares eased to 7s. 1½d. Lewis Berger were slightly lower at 104s., and International Paint 115s., while Pinchin Johnson firmed up to 36s. 10½d. awaiting the full results. Wall Paper Manufacturers deferred were steady at 42s. 3d., pending declaration of the dividend.

B. Laporte kept at 83s., W. J. Bush were

quoted at 63s. 9d., Greeff Chemicals 5s. ordinary at 8s., Monsanto Chemicals 5½ per cent. preference at 23s., and Morgan Crucible 5½ per cent. first preference at 27s. International Combustion shares changed hands up to 126s. 3d., and Cannon Iron Foundries 10s. shares around 18s. 1½d. Burt Boulton were 24s. 6d., British Drug Houses 27s., Cooper McDougall 31s. 3d., and Fisons 48s. 9d. Elsewhere, British Match were 40s. 9d., Borax Consolidated 35s. 9d., and J. Brockhouse 77s. 9d., while British Steel Construction moved up to 13s. 3d. General Refractories became firmer at 17s. 1½d. Imperial Smelting were 14s. 4½d., Amalgamated Metal 18s. 9d., Turner & Newall 79s. 6d., and Radiation 59s. 3d. T. W. Ward moved higher at 37s. 6d. in response to market dividend estimates. Textile issues became dull, with Bradford Dyers 23s. 7½d., Bleachers 12s., and Calico Printers 16s. 6d. Courtaulds at 55s. 3d. and British Celanese at 27s. 9d. were little changed on balance. British Glues 4s. ordinary kept steady at 8s. 6d. with the participating preference dealt in up to 33s.

United Glass Bottle transferred around 65s. Forster's Glass 10s. ordinary were 32s. 6d., while awaiting the results, and Triplex Glass were 41s. 6d. Boots Drug 5s. ordinary eased slightly to 56s., Timothy Whites were 39s. 1½d., and Sangers 28s. 4½d. Beechams deferred kept at 19s. 1½d., and Griffiths Hughes at 29s. 6d. In other directions, Birmid Industries were 80s., British Oxygen 86s. 9d., and British Aluminium 47s. Steadiness at 23s. 7½d. was shown by Gas Light & Coke ordinary, with South Metropolitan Gas stock 96, and Low Temperature Carbonisation 2s. ordinary 2s. 7½d.

Associated Cement were 65s. 6d., awaiting declaration of the interim dividend. Murex became firmer at 85s., pending the full results, while Metal Box showed steadiness at 90s. 7½d. Oil shares were less active, but little changed on balance. Anglo-Iranian were firmer at 116s. 3d. on the strong financial position, although the full results confirm the extent to which E.P.T. bears on earnings. Shell were 81s. 10½d., Burmah Oil 86s. 10½d., and Trinidad Leaseholds 95s. Ultramar became more active and strengthened to 79s. Attock Oil declined sharply at one time on the official denial of recent deal rumours, but later rallied to 69s. British Controlled Oil ordinary and preference have been more active on talk of a capital adjustment scheme to pave the way for regular dividend payments.

British Chemical Prices

Market Reports

TRADE in the London general chemical products market during the past week has continued on a fair scale so far as fresh business is concerned, while the pressure for deliveries against contracts has been steady. There are no price changes to report this week and the undertone of the market generally is strong. In the soda products section no difficulty is experienced in disposing of supplies of such materials as bichromate of soda and prussiate of soda, offers of which continue scarce. The demand for various grades of sulphide of soda has been fairly active and a moderate trade is passing in nitrite and acetate of soda. Fresh inquiry is reported for hyposulphite of soda and also for Glauber salt and salt cake. Chlorate of soda is in short supply with quotations firm. Among the potash chemicals a fair weight of new business is reported in acid phosphate of potash. Offers of bichromate, yellow prussiate and caustic potash are readily absorbed and permanganate of potash is in good call. A moderate business is reported from the coal-tar products section this week with business in pitch confined almost entirely to the home market. Creosote oil, carbolic acid and cresylic acid are steady and a quiet trade is passing in pyridine. A fair call for the naphthas and xylols is reported, while the toluols and benzols are meeting with a steady demand.

MANCHESTER.—Price conditions are firm in virtually all sections of the Manchester chemical market. Movements of supplies against contracts are reasonably steady and some new inquiry has been reported, though no big volume of new business has so far resulted. The leading alkalis, including bicarbonate of soda, soda ash, and caustic soda, are meeting with a fairly steady demand, and deliveries of carbonate and bicarbonate of ammonia, alum, acetate of lime, barium carbonate, and the heavy acids are going forward in fair quantities. Among the tar products, crude tar and the creosote and anthracene oils are in steady demand, while among the light materials there is a good movement of benzol, toluol, naphtha, and the higher grades of xylol.

GLASGOW.—In the Scottish heavy chemical trade the improvement shown last week has been maintained during the current week. Export inquiries still remain rather restricted. Prices keep very firm, with no actual changes to report.

Price Changes

Sodium Bichromate.—In our last issue the price of this commodity was indicated as having fallen from 6½d. per lb. to 6d. per lb. (all grades). No such change has taken place; and our London Chemical Market correspondent asks us to express his apologies for any inconvenience he may have caused our readers.

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